



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,138	01/18/2002	Stephen E. Savas	14912.786	6059

21971 7590 07/07/2003

WILSON SONSINI GOODRICH & ROSATI
650 PAGE MILL ROAD
PALO ALTO, CA 943041050

EXAMINER

HASSANZADEH, PARVIZ

ART UNIT PAPER NUMBER

1763

DATE MAILED: 07/07/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/053,138

Applicant(s)

SAVAS, STEPHEN E.

Examiner

Parviz Hassanzadeh

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 44-82 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 44-82 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 44-56, 60-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over in Shohet (US Patent No. 5,289,010) view of Savas (WO 91/10341).

Shohet teaches a plasma processing apparatus (Fig. 1) and a method of using the same, wherein the apparatus comprising:

a processing chamber 11 for processing a target such as a semiconductor substrate 13 using a plasma (providing a processing chamber for processing a semiconductor substrate using a plasma);

a plasma power source 36 modulated by a pulse modulator 38 (coupling power to a plasma by a first power source using high power cycles and low power cycles);

a second power source 33 its output being modulated by a pulse modulated 32 and being applied to a target stage 14 (substrate support) (coupling power to a substrate support via a second power source using high power cycles and low power cycles); and

a master control 42 controlling the operation of the plasma power source and the bias power source, wherein as shown in Fig. 3, plasma excitation is on except during the time a pulsed voltage is applied to the substrate support (synchronizing the high power cycles of the

Art Unit: 1763

second power source with the low power cycles of the first power source such that the second power source provides high power cycles to the substrate support substantially during the time that the first power source provides low power cycles to the plasma) (column 5, line 24 through column 6, line 63 and column 7, lines 20-47).

Shohet fail to teach an inductively coupling power having a power of about 5 kW during high power cycle.

Savas teaches a plasma reactor (Fig. 5) employing an inductively coupled plasma source for generating plasma wherein the inductively coupled RF power is applied at a frequency range 0.1-6MHz and at a power level up to 10 kW, depending on the size of the reactor (page 7, lines 8-15 and page 12, lines 24-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the inductively coupled plasma source as taught by Savas in the apparatus of Shohet as an art recognized equivalent means of generating plasma. See MPEP 2144.06, Art Recognized Equivalent for the Same Purpose, Substituting Equivalents Known for the Same Purpose (in re Fout, 675 F.2d 297, 213 USPQ 532 (CCPA 1982)).

Regarding claims 45-56, 60, 61: it is the Examiner's position that the limitation recited in the dependent claims are considered *result-effective variable parameter* that would have been obtainable through routine experimentation and optimization process.

Regarding claims 62, 63: the apparatus of Savas further includes a Faraday shield consisting of a dozen conductive plates 46 that conform to the side wall. Each Faraday shield conductive plate is spaced from its neighboring plates by gaps 48 (pages 14, lines 23-31).

Art Unit: 1763

Claims 57-59, 64-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shohet (US Patent No. 5,289,010) in view of Savas (WO 91/10341) as applied to claims 44-56, 60-63 above, and further in view of Corn et al (US Patent No. 4,858,516).

Shohet in view of Savas teach all limitations of the claims as discussed above except for explicitly disclosing a percentage value for the duty cycle.

Corn et al teach a pulsed plasma reactor wherein both high etch rates and good uniformity can be obtained by varying duty cycle from 0 to 100 percent (column 3, line 62 through column 4, lines 21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to vary the duty cycle in the apparatus of Shohet in view of Savas as taught by Corn et al in order to obtain optimized condition of high etch rate and good uniformity.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

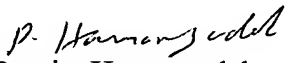
Sandhu et al (US Patent No. 5,344,792) teach a pulsed plasma reactor wherein the duty cycles is adjusted between 30%-70% (Fig. 2) to produce a film having desired characteristic (column 4, lines 32-40 and column 7, lines 59-66).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (703)308-2050. The examiner can normally be reached on Tuesday-Friday.

Art Unit: 1763

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703)308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.


Parviz Hassanzadeh
Primary Examiner
Art Unit 1763

June 30, 2003